

LTSSM Timeout Naming Errata

In chapter 7.5.4 and 7.5.10 there are 6 timeouts referenced but they don't have names. They are:

360ms LFPS timer started in the Polling.LFPS substate.

12ms timer started in Polling.Active.

2ms timer started in Polling.Idle.

12ms timer started in Recovery.Active

6ms timer started in Recovery.Configuration

2ms timer started in Recovery.Idle

The OTG3 team is trying to reference these timeout values in the OTG spec and it is painful since they don't have formal names, e.g.

tPollingLFPSTimeout

tPollingActiveTimeout

tPollingIdleTimeout

tRecoveryActiveTimeout

tRecoveryConfigurationTimeout

tRecoveryIdleTimeout

Below are the changes that would be made to the spec to define these names and several other unnamed timeouts.

Table 7-12 in section 7.5 **Link Training and Status State Machine (LTSSM)**; modify as follows:

| Name | Initial State | Timeout to the Next State | Timeout Value |
|------------------------------|------------------------------------|---|--|
| tSSInactiveQuietTimeout | SS.Inactive.Quiet | SS.Inactive.Disconnect.Detect | 12 ms |
| tRxDetectQuietTimeout | Rx.Detect.Quiet | Rx.Detect.Active | 12 ms |
| tPollingLFPSTimeout | Polling.LFPS ¹ | Compliance Mode, Rx.Detect, SS.Disabled | 360 ms |
| tPollingActiveTimeout | Polling.Active ¹ | Rx.Detect, SS.Disabled | 12 ms |
| tPollingConfigurationTimeout | Polling.Configuration ¹ | Rx.Detect, SS.Disabled | 12 ms |
| tPollingIdleTimeout | Polling.Idle ¹ | Rx.Detect, SS.Disabled | 2 ms |
| tU0RecoveryTimeout | U0 | Recovery | 1 ms |
| tU0LTimeout | U0 | U0 | 10 us |
| tNoLFPSResponseTimeout | U1 | SS.Inactive | 2 ms |
| PORT_U2_TIMEOUT | U1 ² | U2 | U2 Inactivity field set to LMP (refer to Section 8.4 for details) |
| tU1PingTimeout | U1 | Rx.Detect | 300 ms |

| | | | |
|-------------------------------|------------------------|------------------------|--------|
| tNoLFPSResponseTimeout | U2 | SS.Inactive | 2 ms |
| tNoLFPSResponseTimeout | U3 | U3 | 10 ms |
| tRecoveryActiveTimeout | Recovery.Active | SS.Inactive, Rx.Detect | 12 ms |
| tRecoveryConfigurationTimeout | Recovery.Configuration | SS.Inactive, Rx.Detect | 6 ms |
| tRecoveryIdleTimeout | Recovery.Idle | SS.Inactive | 2 ms |
| tLoopbackExitTimeout | Loopback.Exit | SS.Inactive | 2 ms |
| tHotResetActiveTimeout | Hot Reset.Active | SS.Inactive | 12 ms |
| tHotResetExitTimeout | Hot Reset.Exit | SS.Inactive | 2 ms |
| tU3WakeupRetryDelay | U3 | U3 | 100 ms |
| tU2RxdetDelay | U2 | U2 | 100 ms |
| tU3RxdetDelay | U3 | U3 | 100 ms |

Section 7.5.2.3.1 **SS.Inactive.Quiet Requirements**; modify text as follows:

- A 12-ms timer (**tSSInactiveQuietTimeout**) shall be started upon entry to the substate.

Section 7.5.2.3.2 **Exit from SS.Inactive.Quiet**; modify text as follows:

- The port shall transition to SS.Inactive.Disconnect.Detect upon the 12-ms timer timeout (**tSSInactiveQuietTimeout**).

Section 7.5.3.7.1 **Rx.Detect.Quiet Requirements**; modify text as follows:

- A 12-ms timer (**tRxDetectQuietTimeout**) shall be started upon entry to the substate.

Section 7.5.3.7.2 **Exit from Rx.Detect.Quiet**; modify text as follows:

- The port shall transition to Rx.Detect.Active upon the 12-ms timer timeout (**tRxDetectQuietTimeout**).

Section 7.5.4.3.1 **Polling.LFPS Requirements**; modify text as follows:

- A 360-ms timer (**tPollingLFPSTimeout**) shall be started upon entry to the substate.

Section 7.5.4.3.2 **Exit from Polling.LFPS**; modify text as follows:

- The port shall transition to Compliance Mode upon the 360-ms timer timeout (**tPollingLFPSTimeout**) and the following two conditions are met:
- A downstream port shall transition to Rx.Detect upon the 360-ms timer timeout (**tPollingLFPSTimeout**) after having trained once since PowerOn Reset and the conditions to transition to Polling.RxEQ are not met.
- An upstream port of a hub shall transition to Rx.Detect upon the 360-ms timeout (**tPollingLFPSTimeout**) after having trained once since PowerOn Reset and the conditions to transition to Polling.RxEQ are not met.

- A peripheral device shall transition to SS.Disabled upon the 360-ms timeout (**tPollingLFPSTimeout**) after having trained once since PowerOn Reset and the conditions to transition to Polling.RxEQ are not met.

Section 7.5.4.5.1 **Polling.Active Requirements**; modify text as follows:

- A 12-ms timer (**tPollingActiveTimeout**) shall be started upon entry to this substate.

Section 7.5.4.5.2 **Exit from Polling.Active**; modify text as follows:

- A downstream port shall transition to Rx.Detect upon the 12-ms timer timeout (**tPollingActiveTimeout**) and the conditions to transition to Polling.Configuration are not met.
- An upstream port of a hub shall transition to Rx.Detect upon the 12-ms timeout (**tPollingActiveTimeout**) and the conditions to transition to Polling.Configuration are not met.
- An upstream port of a peripheral device shall transition to SS.Disabled upon the 12-ms timeout (**tPollingActiveTimeout**) and the conditions to transition to Polling.Configuration are not met.

Section 7.5.4.6.1 **Polling.Configuration Requirements**; modify text as follows:

- A 12-ms timer (**tPollingConfigurationTimeout**) shall be started upon entry to this substate.

Section 7.5.4.6.2 **Exit from Polling.Configuration**; modify text as follows:

- A downstream port shall transition to Rx.Detect upon the 12-ms timer timeout (**tPollingConfigurationTimeout**) and the conditions to transition to Polling.Idle are not met.
- An upstream port of a hub shall transition to Rx.Detect upon the 12-ms timeout (**tPollingConfigurationTimeout**) and the conditions to transition to Polling.Idle are not met.
- An upstream port of a peripheral device shall transition to SS.Disabled upon the 12-ms timeout (**tPollingConfigurationTimeout**) and the conditions to transition to Polling.Idle are not met.

Section 7.5.4.7.1 **Polling.Idle Requirements**; modify text as follows:

- A 2-ms timer (**tPollingIdleTimeout**) shall be started upon entry to this state.

Section 7.5.4.7.2 **Exit from Polling.Idle**; modify text as follows:

- A downstream port shall transition to Rx.Detect upon the 2-ms timer timeout (**tPollingIdleTimeout**) and the conditions to transition to U0 are not met.
- An upstream port of a hub shall transition to Rx.Detect upon the 2-ms timeout (**tPollingIdleTimeout**) and the conditions to transition to U0 are not met.
- An upstream port of a peripheral device shall transition to SS.Disabled upon the 2-ms timeout (**tPollingIdleTimeout**) and the conditions to transition to U0 are not met.

Section 7.5.6.1 **U0 Requirements**; modify text as follows:

- A downstream port shall enable a 1-ms timer (**tU0RecoveryTimeout**) to measure the time interval between two consecutive link commands. This timer will be reset and restarted every time a link command is received.
- A downstream port and upstream port shall enable a 10- μ s timer (**tU0LTimeout**). This timer shall be reset when the first symbol of any link command or packet is sent and restarted after the last symbol of any link command or packet is sent. This timer shall be active when the link is in logical idle.
- A downstream port shall transmit a single LDN when the 10- μ s timer (**tU0LTimeout**) expires.
- An upstream port shall transmit a single LUP when the 10- μ s timer (**tU0LTimeout**) expires.

Section 7.5.6.2 **Exit from U0**; modify text as follows:

- A downstream port shall transition to Recovery upon not receiving any link commands within 1 ms (**tU0RecoveryTimeout**).
- ...
- An upstream port shall transition to Recovery if it does not receive any link commands or any packets (as specified in section 7.2.4.1.4) within 1 ms (**tU0RecoveryTimeout**).

Section 7.5.7.1 **U1 Requirements**; modify text as follows:

- A downstream port shall enable a 300-ms timer (**tU1Timeout**). This timer will be reset and restarted when a Ping.LFPS is received.

Section 7.5.7.2 **Exit from U1**; modify text as follows:

- A downstream port shall transition to Rx.Detect when the 300-ms timer (**tU1Timeout**) expires.
- The port shall transition to SS.Inactive upon the 2-ms (**tNoLFPSResponseTimeout**) LFPS handshake timer timeout and a successful LFPS handshake meeting the U1 LFPS exit handshake signaling in Section 6.9.2 is not achieved.

Section 7.5.8.1 U2 Requirements

A downstream port shall perform a far-end receiver termination detection every 100 ms (**tU2RxdetDelay**)

Section 7.5.8.2 **Exit from U2**; modify text as follows:

- The port shall transition to SS.Inactive upon the 2-ms LFPS handshake timer timeout (**tNoLFPSResponseTimeout**) and a successful LFPS handshake meeting the U2 LFPS exit handshake signaling in Section 6.9.2 is not achieved.

Section 7.5.9.1 U3 Requirements

A downstream port shall perform a far-end receiver termination detection every 100 ms (**tU3RxdetDelay**).

Section 7.5.9.2 **Exit from U3**; modify text as follows:

- The port shall remain in U3 when the 10-ms LFPS handshake timer timeout (**tNoLFPSResponseTimeout**) and a successful LFPS handshake meeting the U3 wakeup handshake signaling in Section 6.9.2 is not achieved. The port may initiate U3 wakeup again after a minimum of 100-ms delay.

Section 7.5.10.3.1 **Recovery.Active Requirements**; modify text as follows:

- A 12-ms timer (**tRecoveryActiveTimeout**) shall be started upon entry to this substate.

Section 7.5.10.3.2 **Exit from Recovery.Active**; modify text as follows:

- The port shall transition to SS.Inactive when the following conditions are met:
 1. Either the U_x_EXIT_TIMER or the 12-ms timer (**tRecoveryActiveTimeout**) times out.
- A downstream port shall transition to Rx.Detect when the following conditions are met:
 1. Either the U_x_EXIT_TIMER or the 12-ms timer (**tRecoveryActiveTimeout**) times out.

Section 7.5.10.4.1 **Recovery.Configuration Requirements**; modify text as follows:

- A 6-ms timer (**tRecoveryConfigurationTimeout**) shall be started upon entry to this substate.

Section 7.5.10.4.2 **Exit from Recovery.Configuration Active**; modify text as follows:

- The port shall transition to SS.Inactive when the following conditions are met:
 1. Either the U_x_EXIT_TIMER or the 6-ms timer (**tRecoveryConfigurationTimeout**) times out.

- A downstream port shall transition to Rx.Detect when the following conditions are met:
 1. Either the Ux_EXIT_TIMER or the 6-ms timer (**tRecoveryActiveTimeout**) times out.

Section 7.5.10.5.1 **Recovery.Idle Requirements**; modify text as follows:

- A 2-ms timer (**tRecoveryIdleTimeout**) shall be started upon entry to this substate.

Section 7.5.10.5.2 **Exit from Recovery.Idle**; modify text as follows:

- The port shall transition to SS.Inactive when one of the following timers times out and the conditions to transition to U0 are not met:
 1. Ux_EXIT_TIMER
 2. The 2-ms timer (**tRecoveryIdleTimeout**)

Section 7.5.11.4.1 **Loopback.Exit Requirements**; modify text as follows:

- A 2-ms timer (**tLoopbackExitTimeout**) shall be started upon entry to this substate.

Section 7.5.11.4.2 **Exit from Hot Loopback.Exit**; modify text as follows:

- The port shall transition to SS.Inactive upon the 2-ms timer timeout (**tLoopbackExitTimeout**) and the condition to transition to Rx.Detect is not met.

Section 7.5.12.3.1 **Hot Reset.Active Requirements**; modify text as follows:

- A 12-ms timer (**tHotResetActiveTimeout**) shall be started upon entry to this substate.

Section 7.5.12.3.2 **Exit from Hot Reset.Active**; modify text as follows:

- The port shall transition to SS.Inactive upon the 12-ms timer timeout (**tHotResetActiveTimeout**) and the conditions to transition to Hot Reset.Exit are not met.

Section 7.5.12.4.1 **Hot Reset.Exit Requirements**; modify text as follows:

- A 2-ms timer (**tHotResetExitTimeout**) shall be started upon entry to this substate.

Section 7.5.12.4.2 **Exit from Hot Reset.Exit**; modify text as follows:

- The port shall transition to SS.Inactive upon the 2-ms timer timeout (**tHotResetExitTimeout**) and the conditions to transition to U0 are not met.

